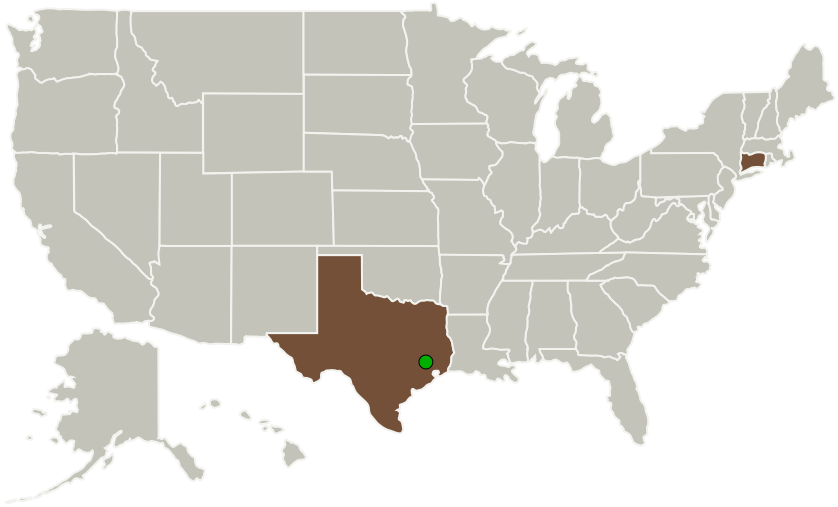
Contact Stress Design Parameters for Titanium Bearings, Phase II

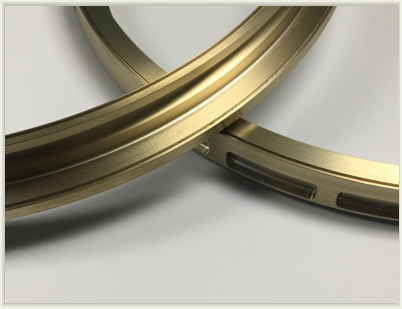
Completed Technology Project (2016 - 2020)

Project Introduction

Air-Lock's Phase I effort tested the effects of ball induced contact stresses on Titanium bearing races. The contact stress design limit that would achieve a planetary exploration suit's required cycle life was determined. These tests were performed on uniformly loaded flat thrust bearing style test plates. The Phase II effort will take this information and use it in a real world application, existing advanced planetary exploration suit's bearings. Specifically focusing on the Z-1 series suit's Hip and Waist, and also the Z-2 Series Hip bearings. These are areas that are known to have large contact stresses due to non-uniform loading through axial restraint lines. This loading yields increased stresses in different areas of the race. With an understanding of the max expected stress, the bearing design can be made to accommodate all contact stresses applied to the race. The Phase II effort will consist of finding the maximum expected contact stresses in these bearings through both test and FEA simulation. The bearing designs can then be optimized to reduce the contact stresses in these areas. Air-Lock will manufacture DVT units in order to cycle test the optimized bearings. The task will be finalized with the delivery of optimized bearings capable of being used on the Z-1 Series and Z-2 Series suits.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Air-Lock, Inc.	Lead Organization	Industry	Milford, Connecticut
Johnson Space Center(JSC)	Supporting Organization	NASA Center	Houston, Texas

Primary U.S. Work Locations	
Connecticut	Texas

Project Transitions

April 2016: Project Start

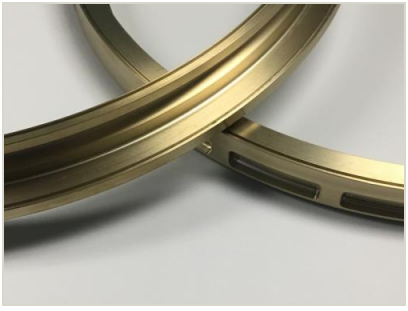
February 2020: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139710)*

Images

Briefing Chart Image
Contact Stress Design Parameters for Titanium Bearings, Phase II *(https://techport.nasa.gov/image/128105)*



Final Summary Chart Image
Contact Stress Design Parameters for Titanium Bearings, Phase II *(https://techport.nasa.gov/image/130745)*

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Air-Lock, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

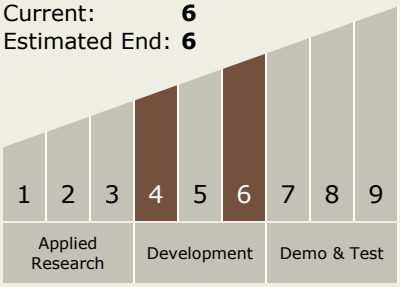
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Brian Battisti

Technology Maturity (TRL)

Start: **4**
Current: **6**
Estimated End: **6**



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Completed Technology Project (2016 - 2020)

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.2 Extravehicular Activity Systems
    - TX06.2.1 Pressure Garment

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System